Unveiling the Secrets of Teaching Mathematics to Students with Special Needs: Challenges, Strategies, and Educator Insights

Ismael W. Baog[1], Erickson J. Anit[2], Lyka Panes-Tapo[3], Marlon M. Huelar[4]

[1]Associate Professor, City College of Davao, Davao City

[2,3]Faculty, St. John Paul II College of Davao, Davao City

[4]Faculty, Caraga National High School, Davao City

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ABSTRACT

This study explores innovative strategies for teaching mathematics to students with special needs, focusing on the significant challenges educators face. Utilizing a qualitative research design through a case study method, data were gathered through semi-structured interviews with five experienced mathematics teachers in the Davao region, Philippines. Key challenges identified include inadequate training, poor communication with parents, difficulties in teaching basic mathematical concepts, short retention spans, and a lack of educational resources. These challenges highlight the need for specialized training and continuous professional development for teachers. The study identifies effective strategies to address these challenges, such as differentiated instruction, collaboration with co-educators, parent-teacher engagement, peer tutoring, and the integration of manipulatives and ICT in teaching. These approaches are shown to improve mathematical learning and cognitive engagement for students with special needs. The research emphasizes the importance of a supportive learning environment and the necessity for teachers to stay updated with the latest instructional methods and resources. The findings advocate for comprehensive support systems in inclusive education, aiming to enhance mathematical achievement and overall educational outcomes for students with special needs.

Keywords: Teaching Mathematics, Innovative Strategies, Students with Special Needs

INTRODUCTION

Teaching mathematics to students with special needs is a tremendously challenging field that takes patience, creativity, and a thorough awareness of different learning styles. Mathematics teachers frequently encounter substantial challenges, such as tailoring lesson plans to individual learning requirements, managing classrooms with a diverse range of skills, and locating adequate resources and assistance. According to 2019 survey results, fewer than 20% of general education teachers feel well-prepared to educate students with disabilities, including Attention-Deficit/Hyperactivity Disorder (ADHD) and dyslexia (National Center for Learning Disabilities & Understood Organization, 2019). Many teachers lack specialized training and express misconceptions about learning disabilities, contributing to their unpreparedness. The report calls for enhanced professional development, dual certifications, and better collaboration to support teachers and improve outcomes for students with disabilities (Mitchell, 2019).

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Internationally, research has been conducted to explore practical strategies for teaching mathematics to students with special needs. In the USA, particularly in Florida, many teachers lack effective strategies for working with special needs students, and their instructional practices are poorly integrated into mathematics textbooks, leading to inadequate and limited success for these students (Allsopp, Lovin, Green, & Savage-Davis, 2003). Teachers and administrators at case study schools identified challenges in student math education, including insufficient staffing, inadequate content knowledge, lack of high-quality assessments, and difficulties in raising achievement levels (Louie, Brett, Yang, & Tan, 2008). In Turkey, a study conducted by Kırmızıgül (2022) revealed that Mathematics teachers in secondary schools face challenges in teaching inclusive education students due to their limited knowledge about special education and inclusive education, as well as pedagogical deficiencies and problems, despite the importance of mathematics in these areas. Mathematics teachers are not adequately prepared for the implementation of inclusive education (Baykaldi, 2017). In India, a study conducted by Asmaveedu (2022) identifies significant challenges faced by teachers, including teaching material, curriculum structure, time constraints, parental expectations, behavioral issues, student motivation, self-esteem building, and emotional issues among children. Moreover, in Finland, special education teachers have higher efficacy beliefs in teaching mathematics to low-performing students with moderate mathematical knowledge compared to mathematic teachers who perceive themselves with high pedagogical knowledge (Ekstam, Korhonen, Linnanmaki, & Aunio, 2017). Furthermore, in Namibia, a study conducted by Mungunda (2023) suggests that Mathematics teachers at a particular school can overcome challenges by utilizing available resources, in-service training, and school involvement in curriculum development.

In the Philippines, there is an increasing body of research focused on improving mathematics education for students with special needs. A national study by Cabañero (2023) examined how inclusive education policies were being implemented in different Philippine schools. According to the research, even though there has been improvement, more has to be addressed in terms of teacher preparation, like training and resource allocation, to support special education programs properly. In Quezon Province, a study conducted by Cularaja & Cularaja (2023) highlights three challenges in inclusive education: lack of ASL training, insufficient personalization in pedagogy, and teacher competency upskilling. It emphasizes the importance of continuous learning and collaboration among teachers and administrators in delivering quality services. In Cebu City, a study by Gonzaga et al. (2024) explores teachers' readiness for inclusive education, highlighting challenges like lack of practical skills, resource shortages, and the importance of qualifications and access to resources in implementation. Additionally, the study highlights challenges math teachers face in delivering diverse curriculum content, including conceptual knowledge, engagement, anxiety reduction, accommodating styles, resource limitations, knowledge gaps, and spiral progression (Dizon, 2024).

Research Questions

This study aimed to explore the challenges and strategies of mathematics teachers in teaching students with special needs. This study specifically aimed to address the following questions:

1. What are the specific challenges and obstacles educators face when teaching mathematics to students with special needs?

2. What strategies and methods do educators use to address and overcome the challenges of teaching mathematics to students with special needs?

3. What are the insights of educators in teaching mathematics to students with special needs?

Theoretical Framework

This study was anchored on Tomlinson and Imbeau's (2010) Differentiated Instruction (DI). This theory emphasizes the importance of flexible and responsive teaching practices that cater to the diverse needs of students. It advocates for an inclusive, student-centered approach that aims to maximize the potential of every learner. The primary goal of differentiated instruction is to enhance the growth of all students by addressing their starting points. Using differentiated instruction as a theoretical lens allows educators and researchers to analyze and understand how instructional strategies can be adapted to meet the unique needs, interests, and abilities of individual students. In the context of mathematics teachers teaching students with special needs, the theory becomes particularly relevant. It will help the teachers to create strategies and techniques to cater to the different needs of their students, including those students with special needs. This theoretical lens not only acknowledges the heterogeneity of student abilities and learning styles but also underscores the imperative of equitable access to mathematical learning opportunities for students with special needs.

RESEARCH METHODOLOGY

This section describes the methodology used in this case study, addressing several components such as the research design, participant selection, sampling strategy, the role of the researcher, data analysis, the study's trustworthiness, and ethical considerations.

Research Design

The study employed a qualitative research design, utilizing a case study approach to explore innovative teaching strategies for instructing students with special needs in mathematics. The research data were collected through semi-structured and in-depth interviews with five subject teachers who were purposively selected for their experience in teaching mathematics to students with special needs (Yin, 2018). This qualitative case study approach was selected to distill a large body of information into a single, researchable subject, facilitating the collection of rich, detailed data through in-depth interviews of participants' experiences (Stake, 1995). Codes and themes were used to analyze the data, providing a structured method for interpreting the participants' experiences (Braun & Clarke, 2006).

Participants and Sampling Design

In this research study on innovative strategies in teaching mathematics to students with special needs, the participants consist of five experienced mathematics teachers employed in both private and public high schools in the Davao region (Kroesbergen & Van Luit, 2003). These educators have been selected based on their substantial experience and proven dedication to working with students who have special needs, ensuring they bring valuable insights into the study (Woodward & Baxter, 1997). Their backgrounds encompass a range of instructional settings and student populations, providing a comprehensive perspective on the unique challenges encountered in diverse educational environments (Ogbuehi & Fraser, 2007). With this specific group of respondents, the study aims to uncover detailed and contextually relevant challenges, as well as strategies these teachers employ to teach mathematics effectively.

Role of the Researcher

In a case study design, researchers serve as both observers and interpreters of the data. In this study, they engaged closely with participants through semi-structured interviews to collect detailed, firsthand accounts of their experiences. The researchers' role extended beyond data collection to active listening, deeper probing, and maintaining an ethical and empathetic approach throughout the study (Baxter & Jack, 2008).

This methodology ensures that the participants' complex and nuanced experiences are accurately captured and interpreted (Houghton et al., 2013).

Data Collection and Instrumentation

Semi-structured interviews were the primary method of data collection, selected for their ability to provide both flexibility and depth. This approach allows participants to express their experiences in their own words, resulting in rich, qualitative data. Open-ended questions enabled a comprehensive exploration of the challenges, strategies, and factors influencing mathematical achievement and cognitive engagement. The use of audio recordings and detailed transcriptions ensured that the data were captured accurately and comprehensively (DeJonckheere & Vaughn, 2019).

Data Analysis

The study commenced with a rigorous participant recruitment process, adhering to pre-established criteria. All five qualified participants underwent interviews, which were conducted via Google Meet and recorded using audio tapes, subsequently transcribed for analysis (Bonisteel, Shulman, Newhook, Guttmann, Smith, & Chafe, 2021). The collected data served as a foundational tool to delve into the challenges educators face in teaching mathematics to students with special needs, elucidating strategies employed to overcome these challenges, and identifying insights in teaching mathematics to students with special needs.

The semi-structured interview method was deliberately chosen for its ability to elicit nuanced perspectives from educators. Open-ended questions provided participants ample opportunity to candidly share their experiences, ensuring a rich dataset conducive to in-depth analysis (Heath, Williamson, Williams, & Harcourt, 2018). Throughout the interviews, meticulous attention was paid to capturing every participant's response through detailed observation and audio recording.

Upon completing the data collection phase, a systematic approach was employed to analyze the gathered information. Initially, transcripts of the semi-structured interviews were carefully reviewed and coded to identify recurring themes and patterns. This coding process involved categorizing responses according to predefined themes related to teaching challenges, coping strategies, and insights of teachers in teaching mathematics to students with special needs.

The transcripts were subjected to thematic analysis, a methodological framework used to identify, analyze, and report patterns within the data. Each transcript was reviewed multiple times to ensure thorough familiarity with the content, followed by the systematic application of codes to segments of text relevant to the study's research questions. This iterative process facilitated the discovery of both expected and emergent themes, enriching the understanding of educators' perspectives on teaching mathematics to students with special needs.

In synthesizing coded data from the interviews with observational insights, the researchers identified key findings. These findings were corroborated across participant responses and supported by direct quotations, providing a robust basis for understanding the complexities involved in teaching mathematics in inclusive educational settings. The analytical process emphasized transparency and rigor, ensuring that interpretations were grounded in the voices and experiences of the participants.

RESULTS

This chapter presents the outcomes of the qualitative analysis performed on the responses to the research questions. The results are structured based on the emerging themes, sub-themes, core concepts, and their categorization.

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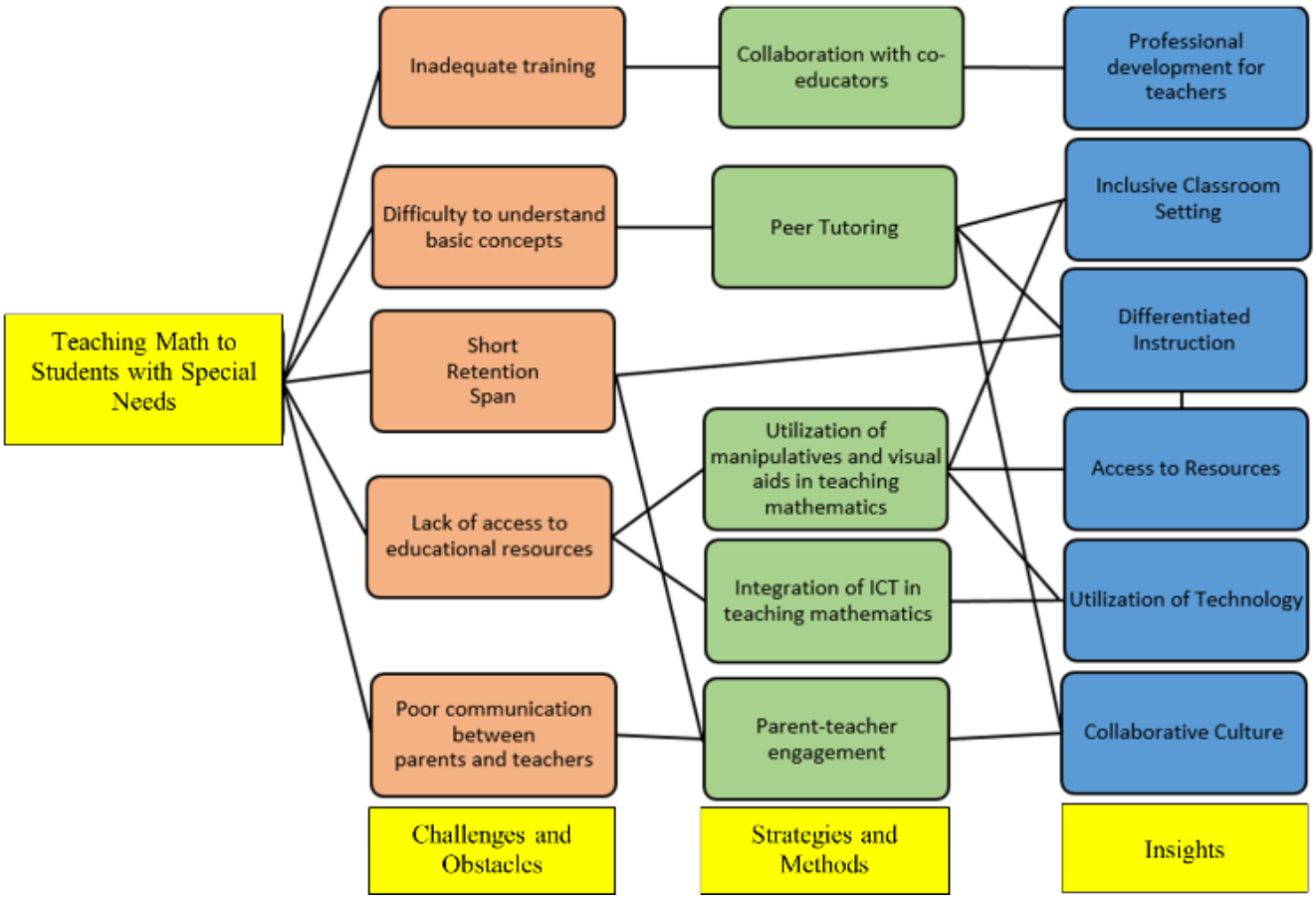
Thematic Analysis



This diagram illustrates the challenges, coping mechanisms, and insights related to math educators teaching students with special needs. These elements are interconnected, showing how challenges can be mitigated by various coping mechanisms, leading to valuable insights for improving the educational experience of students with special needs.

Challenges and Obstacles Educators Face When Teaching Mathematics to Students with Special Needs

Inadequate Training

Lack of teacher training can have a significant and negative impact on inclusive education. Inclusive education seeks to provide equal opportunity to all students, regardless of ability, disability, or background. When teachers are not appropriately equipped to meet their students' different needs, inclusive education's efficacy suffers in a number of ways. T1's statement, ": *Lack of proper training in handling students with special needs*…" implies that she really needs to undergo trainings and seminars in order to cope with students with special needs. T2's insights, "*I agree. I think teaching students with special needs, I need training on how to handle students who have ADHD and other illnesses. So, I need more training and seminars*." T4's assertions, "*Mostly of my trainings that I have attended were content-based. I haven't attended yet the training for this kind of catering students with special needs*.", encapsulates that teacher training is critical to the successful implementation of inclusive education. It provides educators with the information, skills, and methods necessary to foster an inclusive and supportive learning environment for all students. Due to a lack of training, teachers frequently express feeling unprepared to work with students who have special needs (Forlin, Loreman, Sharma, & Earle, 2009). A research study indicates that educators

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with specific training in special education are more likely to feel competent and self-assured in their positions (Avramidis, Bayliss, & Burden, 2000). Continual professional development is essential to sustaining and improving educators' abilities in inclusive learning. Research by Darling-Hammond, Hyler, and Gardner (2017) indicates that continuous, collaborative professional development programs with an emphasis on practical application are the most effective at changing teaching methods. These programs should also be modified to meet the specific requirements of teachers who work with students with special needs. In addition, investing in professional development enriches teachers while also ensuring that all children receive a high-quality, inclusive education.

Difficulty to Understand Basic Concepts in Mathematics

Basic mathematical concepts and skills are challenging for students with learning difficulties, which has an adverse effect on their problem-solving abilities. T1's perspective, "*I think even the fundamental operations like adding, subtracting, multiplying and dividing numbers, it's very difficult for them to solve. So how much more if I'm going to introduce algebra? So, with variables, it's very difficult to teach them because we love prerequisite knowledge in my lesson*…" T2 affirms, "*Yes, the basic, I guess, the basic knowledge is the most important one…the operations in mathematics without fully understanding it, they cannot proceed to higher lessons. So, with that, they have difficulty in leveling up.*", denotes those students with specials needs are still unable to master and grasp the basic concepts especially in four fundamental operations on mathematics. T4 mentioned, "*I have three challenges, inability of the students on basic concepts of mathematics just like the four fundamental operations… Thirdly, inability to understand the basic terms in mathematics like the words and phrases that can be translated into mathematical symbols*.". T5 stated, "*… So, they have these weak foundational skills in mathematics, so they were not able to comprehend and understand properly the new lessons since even with basics. So, they don't have knowledge at all or they tend to forget."* implies that without understanding mathematical concept, it is impossible for those students with special needs to understand new concept. This means learning mathematics must be gradual and sequential and based on past learning experiences in order to connect and link to new concepts. In addition, to excel in more advanced topics, students with special needs must have a good understanding of basic mathematical principles. According to Gersten et al. (2005), students who struggle with simple operations like addition and subtraction often face significant challenges when exposed to higher-level mathematics, resulting in low overall academic performance and decreased problem-solving abilities. Allsopp et al. (2003) believed that instruction should focus on students' current understanding levels to prevent memorization and ensure learning, especially for students with special needs, avoiding a precarious situation.

Short Retention Span

Students with special needs have difficulty retaining learned information, repeating information read or heard, following multiple directions, and performing tasks in the right sequence, particularly in mathematics. T1's statement, "…*And the focus to learn of the learner to pay attention in class as well as its retention…*". T4 added, "…*the lack of retention span of the learners*…". T5's advice, "*Teaching students with special needs is really difficult, I can still remember when I first entered the class, I couldn't help but notice that the students typically the students with special needs have a short retention span…*" indicates that having a short retention span tend to perform worse on class, struggle to retain information long-term and have a harder time connecting disparate ideas into cohesive understanding. With that being said, Pillado (2020) emphasized that students with retention difficulties struggle to remember class lectures and encounter challenges in solving mathematical problems that require a series of steps. Thorne (2021) further noted that students with memory encoding deficits struggle to remember directions or recently read material. These students often avoid tasks requiring sustained mental effort, such as schoolwork and homework. Also, they do not activate prior knowledge or connect it to new information, leading to a failure to elaborate information they receive.

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Lack of Access to Educational Resources

A lack of resources can lead to reduced learning space and sharing of teaching/learning resources, which can negatively impact both teachers and students with special needs. Furthermore, the perception of resources has a significant influence on students' well-being in school, academic self-concept, and social inclusion. T1's perspective, "…*I think I need more manipulatives visual aids that will support my teaching towards this kind of student.*". T3's insights, "*I think that the resources I'm lacking is the learning materials….so, I think that I need to improve more especially when giving them more learning materials*." T5's assertion, "… *This is something I lack on especially that I don't have enough resources and there are still classrooms having no television.*" suggests that the challenges of using learning materials and manipulatives are non-availability of materials, laziness of the teachers, lack of skill and strategies, financial constraint, lack of appropriate materials in a textbook, time constraint, lack of support from authority. The study reveals that classrooms for children with developmental disabilities have poor learning environments, suggesting that placing them in inclusive classrooms with ordinary learners is insufficient. Ensuring proper support and services is crucial. Furthermore, the study findings supported research by Abubakar (2020), as cited by Thuranira, Ikiara, and Thuba, (2022), revealing that schools lacking adequate educational resources lead to poor student performance. These resources include textbooks, internet facilities, videos, CDs, projectors, and other electronic and print media. Similarly, Ogbu (2015) conducted research and discovered that insufficient instructional materials and facilities often result in students' low academic performance, low examination scores, and limited practical skill acquisition.

Poor Communication Between Parents and Teachers

The lack of communication between parents and teachers can have various detrimental effects. It can lead to prolonged misunderstandings and disharmonious relationships. T1's assertions, "*But if we are not able to receive an update from the student, especially from the parents, because they're so busy. So, it's really a problem on how we can address this kind of situation in our class because we cannot give update to them.*" This denotes that a lack of communication between parents and teachers can result in dissatisfaction. T2's perspective, "…*So it's very important for teachers to communicate to parents about the problems of their child so that the teacher will be aware of what to do and not to do when handling the students*…" implies that through consistent communication by the teacher, parents must be aware of what their children do inside the classroom even they lack the knowledge and skills to help with their child's education. T3's statement, "*Sometimes, it's really sad. As an educator, we should always consider those students with special needs… if there will be a barrier, that's I think poor communication with the parents… since my students struggled in hearing*…" suggests that even those struggling students in hearing must have a constant communication with their parents. Johns and Shahul (2020) supported that insufficient parental involvement and lack of human resources make special education teachers' work difficult, resulting in students suffering due to the pressures placed on them. Moore (2000) emphasizes the importance of strategies in fostering strong school-home connections. This study reveals a discrepancy between parents' and teachers' perceptions of school-to-home communication, suggesting teachers need to differentiate communication methods and instructional strategies accordingly. The study of Ozmen et al. (2016) confirms major communication preventive issues between teachers and parents, including physical distance, socio-cultural differences, financial problems, lack of trust, inappropriate school activities, teachers' misbehaviors, and parents' education level.

Coping Mechanisms of Educators to Overcome Challenges of Teaching Mathematics to Students with Special Needs

Collaboration with Co-educators

Educators use co-teaching as a service delivery option to give students with disabilities access to the general

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curriculum and provide the specialized instruction they need to succeed. T1's advice, "*I asked with my colleagues, with my co-teachers on how I am going to address this kind of learners. And it's very helpful because I also gain insights from them.*" implies that collaborative teams support one another to develop their skills in specific teaching strategies and students learn even faster when highly skilled teachers lead collaborative teams focused on understanding what is working and why. T2's insights, "*It's very helpful to ask my co-educators the tips on how to teach mathematics as well as the specialists because they are the ones who are experts in the field…*" highlight that collaboration with special education specialist helps in providing meaningful support to children with disabilities. T3's mentioned, "*It's really amazing that I communicate with them. They taught me how to use another way or media of teaching special needs students. They also taught me that sometimes students with special needs can learn if it's colorful, attractive, manipulative and authentic…".* T4's perspective, "*There are strategies that you can adapt and adopt from other teachers which you think you can use in your class. As we are now in the technology era, we're able to go with trends in integrating technology in teaching with the collaboration of younger educators."* emphasized that through teachers' collaboration with co-teachers, they can gain more strategies and techniques by pooling their knowledge, expertise, and resources, educators may create cutting-edge teaching methods that raise student engagement, success, and achievement. The study of Paires and Mandal (2023) confirms the perception of collaboration between SPED and mainstream educators, focusing on knowledge, attitude, and readiness as moderating variables. It suggests that teachers should be provided with inclusive education orientation and knowledge to enable teaching alongside mainstream educators. This collaboration can improve teaching techniques, knowledge, and readiness, ensuring success in inclusive environments. The study of Hermoza (2022) validates that co-teaching is a successful and effective strategy for providing equitable educational opportunities for students with disabilities. It involves careful planning and collaboration between teachers, with administrators creating time for collaboration, including planning, grading, assessment, and sharing information about individual student needs.

Peer Tutoring

Peer tutoring involves pairing higher-performing students with lower-performing students or students with disabilities to review and teach academic materials. It has been shown to be an effective teaching strategy that benefits both tutors and tutees by increasing self-confidence and skills for tutors and providing individual attention that improves performance for tutees. T2 mentioned, "…*They may also provide students with different levels of support including one on one instruction, small group instruction, or peer tutoring".* T3's perspective, "*I let my students teach their classmates because not all students can learn from their teacher. They can also learn from their classmates… we conducted peer tutoring…we conducted mathematics tutoring for two hours…those are different methods that I conducted as a teacher."* this encapsulates peer tutoring because it can offer a range of benefits to students with special needs, such as improving academic performance and motivation with individualized feedback, scaffolding, and reinforcement. The study of Stenhoff and Lignugaris (2007) confirms that peer tutoring in secondary settings improves the academic performance of students with special needs, with training tutors significantly impacting tutee outcomes. Okilwa and Shelby (2010) supported that peer tutoring improves academic outcomes for students with disabilities in general and special education settings, regardless of disability type, and leads to academic growth in core subjects.

Differentiated Instruction

In order to address the range of skills and needs of students in today's diverse classroom, teachers need to develop and use varied teaching and assessment strategies. Differentiated instruction is one such technique that provides students with different avenues for acquiring and processing content. T1's advice, "… *I also used differentiated instructions or differentiated tasks and the students will just choose a task that is fitted or based on their preference, based on their abilities and skills.".*

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T2's insights, "*Differentiated the instruction, it meets the individual needs of each student. It involves assessing the students' strengths weaknesses and learning styles. And adapting instructions to meet those unique needs…"* T4's statements, "*The methods should be differentiated in order to cater all of these learners, especially with special needs…"* highlights diversity and inclusion which improve teaching and learning. Students learn and enrich their abilities to think critically and creatively as they engage in conversations across differences, especially when all learners' abilities and attributes and embraced. According to Stokes (2002), visual aids may significantly improve teaching and learning by catering to students who learn best visually and thus improving their academic achievement. This emphasizes the crucial role that visual literacy plays in education. This approach enhances comprehension while also fostering a more productive and inclusive learning environment. Comparably, Pasira (2022) highlights how crucial it is to modify the classroom to fit the particular requirements of every student since this has been demonstrated to improve academic results. Instructors can do this by implementing tactics including tiered assignments, flexible grouping, changing the learning environment, and utilizing a range of teaching philosophies to differentiate instruction in inclusive classrooms.

Utilization of Manipulatives and Visual Aids in Teaching Mathematics

One of the many strategies by which students with special needs can bring meaning to abstract mathematical ideas is through the use of manipulatives. Manipulatives have the ability to help students with special needs learn new concepts and relate new concepts to what they have already learned. T2's assertion, " *When teaching mathematics, I use visual aids and math manipulatives to make my special needs students attract their attention because if I teach without manipulatives they get more. So, like for example, when teaching operations in mathematics, I use addition cards or multiplication cards and I show it to them with pictures as well."* implies that students frequently are attracted to using manipulatives when they have the option to imitate the actions of solving mathematical operations. T4 mentioned, "…*Manipulatives like Algebra Tiles – aside of teaching the concepts oh how to do the factoring, that Algebra Tiles is useful."* This suggests that using algebra tiles as a tool or manipulatives enables students with special needs to deepen their understanding of concepts and make connections between new information and information they already know. The study of Larbis and Mavis (2016) confirms that algebra tiles significantly improved students' performance and thinking processes in solving problems, making them an effective and promising approach to teaching algebra. Adegboyega et al. (2023) validate the findings, indicating that incorporating manipulatives into mathematics classes improves student learning, accessibility, and effectiveness for all abilities and levels, especially low-achieving and learning-difficult students, and offers opportunities to push faster learners to grasp concepts.

Integration of ICT in Teaching Mathematics

ICT integration can improve students' mathematical skills by providing complementary skills such as critical learning, information skills, creative reasoning, and problem-solving skills. It can also remove inequalities in math teaching environments and is suitable for students with disabilities. T1's statement, "… *I always incorporate technology. So, I think the ICT is very helpful, so that my students will engage in attention to my class in teaching mathematics."* denotes that ICT can stimulate, motivate and spark students' appetites for learning and helps to create a culture of success. T2's advice, "*By incorporating technology, technological devices, or tablets, and other digital communication tools, it helps students with special needs to learn while helping them gain the confidence to speak up"* suggests that incorporating technology can have a positive impact on a student's self-esteem – especially if they encourage active use and creativity rather than passive content consumption. T3 mentioned, "*I integrate technology in teaching mathematics like I play videos relating to my topic, and I play videos on giving examples so that they can learn from it."* This implies that visual resources such as videos, images, or other form of documents that can be used as a further aid for students to understand the syllabus even better. A study by Ittigson and Zewe

(2003), as cited by Dhakal (2018), highlighted the essential role of technology in mathematics education, stating that ICT improves instructional methods and deepens students' understanding of basic concepts. Numerous studies have examined the benefits of using ICT in mathematics. Becta (2003), also cited by Dhakal (2018), summarized these advantages, noting that ICT encourages greater student collaboration, enhances communication and knowledge sharing, and provides immediate, accurate feedback, which boosts motivation. Additionally, ICT allows students to focus on strategies and the interpretation of answers rather than spending time on tedious computations.

Parent-Teacher Engagement

A partnership approach to parental engagement aims to give students with disabilities the best chance to achieve their potential. Actively engaging parents and teachers of students with special needs increases opportunities to plan effectively for the student, creates successful pathways for academic success, and builds upon the community links and partnerships necessary for that child and his or her family. T3 convinces, "*…parents and caregivers are the extension of our teaching; they play a significant role at home… I always communicate with their parents during lunchtime or noon break…especially those students who are really forgetful, I have to connect to their parents to remind their child to assist them about their activities.".* T4 mentioned, "*The biggest role should come to the parents. We, teachers, are just the second parents. Parents should always follow up with their learners… every now and then there is communication between the parents and the teacher, as our end we know how to adjust… and the parents should assist and know what lessons their children are learning or need to study."* signifies that parent-teacher engagement should develop and work hand in hand in order to help improve the academic achievement of their students particularly those with special needs. T5's assertions, "*As part of preparation also, I automatically call the attention of the parents/guardians to gain more information or background of the students since they know their child too well…"* emphasized that calling out the attention of the parents/guardians enables us to gain valuable insights that can shape their student's character and abilities and determine the background of their child/children. Major (2023) confirms the findings, stating that effective communication requires regular communication, common language, a positive attitude, and appropriate use of technology. Teacher should emphasize practical education, focusing on establishing communication with parents of different socioeconomic backgrounds. Đurišić and Bunijevac (2017) affirm that parental involvement in schools improves educational programs, which leads to student performance, teacher satisfaction, and a better school climate. Partnership initiatives emphasize family and community involvement to ensure effective participation.

Insights of Educators in Teaching Mathematics to Students with Special Needs

Professional Development for Teachers

Professional development is an important strategy for ensuring that educators are equipped to support deep and complex student learning in their classrooms. T1's statement, "*…I think it is very important to have all teachers a proper training on how we are going to deal or handle the students with special needs.".* T4 suggests, "*…But if we will be sent to seminars or just an orientation of how you're going to handle this kind of learners maybe it's a challenge for me how to teach them well…"* This implies that fostering and developing teachers' professional perceptions along with providing them the knowledge and skills to promote inclusive education must be part of all teacher education programs. In addition, teachers understand each student's unique goals particularly with special needs, challenges, and needs, requiring them to continuously change and adapt. It requires creativity and compassion to reach every student. Darling-Hammond et al. (2017) suggests that the effectiveness of Professional Development is closely linked to the educational system. Various factors within schools and the broader educational system can either facilitate or hinder the success of Professional Development initiatives. It is particularly important to recognize the diverse needs of students with special needs, emphasizing the necessity for customized approaches. Byrd

and Alexander (2020) emphasize that teacher education and development programs should focus on three essential areas: making informed decisions based on assessment data, fostering understanding and empathy for students with special needs, and improving communication with all stakeholders involved in the education of this specific group of students.

Inclusive Classroom Setting

The learning environment increases students' attention and focus, promotes meaningful learning experiences, encourages higher levels of student performance, and motivates students to practice higher-level critical thinking skills. T2 affirms, "*I agree, a more positive classroom, students are more motivated, and they put more effort into learning activities."* elaborates that a positive learning environment creates a learning environment where students feel motivated to learn within the boundaries and expectations of a safe classroom. T3's insights, "*The inclusivity inside the classroom begins with having good relationship to their classmates as well as with their teacher… the learning environment should not be annoying and uncomfortable. The classroom has a good influence on them when it is conducive to learning and health. We need to do our best to make our classroom presentable and effective to the students."*. T4's advice, "*… in the physical aspect, when the room temperature is very hot…it also affects the learning of the students…there is no learning that will happen… our classroom should be conducive for learning, well-lighted and well-ventilated"* implies that teachers can help to create a positive learning environment by establishing clear classroom rules and procedures, maintaining an environment that promotes respect, inclusivity, and diversity, and encouraging students to receive and accept constructive feedback. The study of Sylvestre (2021) confirms that learning environments must be maintained such that they can contribute positively to student learning and success. Students learn better when their school is easily accessible, safe, sanitary, generally pleasant, and cognitively exciting. The study of Bucholz and Sheffler (2009) supported the findings, noting that the classroom environment developed by a teacher has a considerable impact on a student's learning ability and comfort, encouraging cooperation and acceptance in addition to the teaching methods used.

Differentiated Instruction

Differentiated instruction has rapidly evolved as a teaching approach to meet the diverse and heterogeneous needs of students with special needs/ disabilities in mainstream classrooms. T2's statement, "*I realized that students with special needs are unique, so I need to have different strategies to adapt to their special needs"* elaborates that differentiating instruction typically uses an assortment of teaching methods and instructional approaches, adjust assignments to meet individual student needs, provide a variety of options on how a student can demonstrate their knowledge and modify instruction as needed according to assessments. T4's advice, "*As a teacher, I should not focus only on what type of learners. You need to assess all of these learners where those learners belong… from there I can be able to develop my differentiated strategies, activities, and assessments which make my teaching effective"* this suggests that through differentiated assessment, teachers gather data before, during, and after instruction from multiple sources to identify learners' needs and strengths. Moreover, students are differentiated in terms of their knowledge and skills. They differ in the ways and speeds at which they process new learning and connect it to prior knowledge and understanding as well as they differ in the ways they most effectively demonstrate their progress. Differentiated instruction fosters an interactive learning atmosphere where teachers and students work in harmony and alignment (Sarzhanova, et al. 2023). This approach not only helps students achieve their learning goals but also fosters joy and enthusiasm for learning (Tomlinson, 2016). Thus, teachers understanding of differentiated instruction and its strategies enable them to grasp student-centered techniques, effectively share information and knowledge, select suitable methods and tools, and employ effective assessment strategies to meet the objectives of the teaching and learning process.

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Access to Resources

Availability of teaching and learning materials, resource centers attached to ordinary schools, and teachers' attitudes toward the inclusion of children with special needs are most important for the success of implementing inclusive education. T3's statements, "*First, I have to know what I am achieving… go back to your objectives all about. Consider the learners, even if you have the most exquisite materials or visual aids but if it's not aligned with the needs of your students, it became useless… you have to know who are your learners, know what you are teaching and you have to decide what materials you're using."* T4's advice, *"Well, these materials are readily accessible and engaging to this kind of learners by ensuring them that they will be catered based on their abilities and capabilities."* signifies that educator benefits from instructional materials by having readily available resources and tools that aid in the planning and delivering lessons, saving time and enhancing instructional quality when teaching students with special needs. The study of Naisianoi et al. (2020) confirms that the availability of teaching and learning materials significantly impacts students' academic development and facilitates effective learning interactions both within and outside the classroom. The study of Adalikwu and Iorkpilgh (2013) affirms the findings, indicating that when students have access to instructional resources, they perform higher and more effectively than when they do not.

Utilization of Technology

Technology-based teaching and learning are more effective in comparison to traditional classrooms. This is because using ICT tools and equipment will prepare an active learning environment that is more interesting and effective for both teachers and students. T1 mentioned, "*Teaching math using ICT, using TV, introducing PPT with a creative presentation at the same time turning my lesson easy to understand and comprehend. The use of online games is one way to get the attention of the whole class and engage with the lessons."* emphasized that utilization of ICT can enhance levels of students' engagement similar to what games can do. Research on the effectiveness of utilizing computers for teaching mathematics, for example, demonstrates that there are, in fact, a lot of opportunities for integrating technology in education. According to Tolentino (2016), there are several benefits to incorporating technology into the classroom, especially when it comes to teaching Mathematics with computers. Educators should also keep up with technological changes, as stressed by Sarwendah, Azizah, and Mumpuniarti (2023). They observe that improved communication between teachers and students throughout the learning process is fostered by technology, which also improves students' comprehension of the subject matter.

Collaborative Culture

Collaboration in special education is to ensure all students receive lessons and assignments that meet their individualized needs. Everyone who assists students who have disabilities can work together to promote academic success. T1's mentioned, "*As I've said that peer instruction and group activities are one of my strategies in integrating mathematics activities. It's very helpful for me that I can be able to integrate that kind of learning that my students really played a significant role when integrating learning. They really applied what they have learned and collaborated with their peers/classmates."* T4's assertion, *"That would really affect the learning of the students with special needs… that's why collaboration is effective as well…everyone will help their classmates to learn…"* emphasized that peer tutoring helps the students build relationships, which builds communication and social skills. Furthermore, students with disabilities respond better to peers than adults. Students with disabilities get more individual attention than one teacher can provide on their own. Professional collaboration has been recognized as a valuable tool for supporting teachers and other professionals in effectively serving students with disabilities (Brownell, Adams, Sindelar, Waldron, & Vanhover, 2006) and has been identified as a best practice in special education (Cross, Traub, Hutter-Pishgahi, & Shelton, 2004). Therefore, the concept of professionals from

diverse disciplines working together and collaborating has been linked to the long-term success of students with special needs (Banotai, 2006; as cited in Bauer, Iyer, Boon, & Fore, 2012).

CONCLUSIONS

The study revealed that teachers who were handling and teaching students with special needs faced challenges, including Inadequate training, difficulty in understanding basic concepts in Mathematics, short retention span, lack of access to educational resources, and poor communication between parent and teacher, highlighting the need for specific aspects of teaching practices and the learning environment contribute to improved mathematical achievement and cognitive engagement among students with special needs.

Teachers emphasized the importance of having specific teaching practices and strategies to address and overcome the challenges of teaching mathematics to students with special needs. Employing differentiated instruction, peer tutoring, utilization of manipulatives and visual aids in teaching Mathematics, integration of ICT in teaching Mathematics, parent-teacher engagement, and collaboration with co-educators. Furthermore, the finding shows the role of professional development of teachers in teaching students with special needs and the continuous development of effective strategies and practices to cater to the diversity of learners, particularly students with special needs.

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